

FACULTY RESEARCH INTERESTS  
DEPARTMENT OF BIOLOGY  
SHIPPENSBURG UNIVERSITY

DR. SHERRI E. BERGSTEN

The focus of my lab is to better understand the genetics of behavior through studies in the fruit fly, *Drosophila melanogaster*. The courtship behavior of the fruit fly is often referred to as a courtship ritual because the steps that precede courtship are so reproducible and so important for mating success. There are many genetic characteristics that influence mating behavior and mate choice. Students working in my lab are encouraged to study their choice of characteristics and the way that different characteristics interact to control mating behavior. These studies can include behavioral assays or alteration of genotypes through recombinant DNA technology. Currently, the students in the lab are studying pathways of pheromone production and detection to better identify the critical differences between flies of varying genotypes with direct or indirect alteration of pheromonal cues, such as those compensating for defects in other sensory pathways. Studies in other labs have classified a large family of genes as pheromone binding proteins based on sequence homology. Known mutations exist in only a very small subset of these genes, which means that their specific functions are not known. We plan to study the functions of some of these genes through RNA interference, which can delete gene functions by adding in a double-stranded RNA copy of a portion of the gene.

DR. MARCIE L. BAER-LEHMAN

My primary research interests involve pathogenic microorganisms and the diseases they cause, relationships between microbial populations in their natural environment and microbial

genetics. Specific areas of interest include: 1) interaction of the microbial predator *Bdellovibrio bacteriovorus* with its prey; 2) biofilm communities; 3) vector-borne infectious diseases; and 4) microbial diversity. I use a variety of approaches including: molecular techniques, field-based methods and classical microbiological (lab) based methods to examine different microbial populations. I encourage student participation in research and am happy to become involved in projects of mutual interest.

DR. ALYSSA BUMBAUGH

My research interests include investigating the roles of selection, mutation, and recombination in the emergence/reemergence of pathogenic forms of bacteria. It is known that gene acquisition can provide bacteria with new phenotypic properties and there are reports that gene loss can impact the expression of known virulence factors. I am interested in determining how genomic acquisitions or large genomic deletions impact overall phenotypic virulence characteristics. Specifically, my research studies the genetic structure of natural bacterial populations; the evolution of pathogenic forms of bacteria; molecular epidemiology; and invasive bacterial pathogens. Much of this work is focused on *Shigella* and enteroinvasive *Escherichia coli*.

#### DR. PABLO DELIS

I am interested in morphology, ecology, behavior, and evolution. My research focus is Vertebrate Biology, with special emphasis on amphibians and reptiles. With the use of comparative approaches, I examine morphological, ecological, and behavioral specializations that explain the current demographic status of species and communities. Given the present biodiversity crisis, it is important to take a proactive stand, and generate models that predict the fate of species under pressure from human disturbance. My goal is to establish a long term and comparative study to address demographics and conservation of Pennsylvania's Herpetofauna. In my research strategy, I combine traditional herpetological and field ecology techniques, as well as, remote sensing (GPI), and molecular biology. Currently, I am developing permanent lines of professional interaction with research institutions in Florida (USA), Andalucia (Spain), and Murcia (Spain).

#### DR. LUCINDA ELLIOTT

I am involved in a number of collaborative research projects with SU faculty and the United States Army Medical Research Institute of Infectious Diseases (USAMRIID) at Ft. Detrick. One project is focused on elucidating the role the ubiquitous enzyme, calpain, on invasion and migration of brain tumors. The hope is that by studying one mechanism involved in regulating tumor invasion in the brain, new treatment paradigms can be generated that will prolong the life of patients suffering from glioblastomas. In addition, I am involved in an ongoing collaborative effort with Drs. Lehman, Patrie and Stewart to determine the prevalence of the causative agents of Lyme disease,

human granulocytic ehrlichiosis (HGE), human monocytic ehrlichiosis (HME) and tick borne viral encephalitis in ticks and blood collected from hunter killed deer in South Central Pennsylvania. Finally, I am collaborating with Dr. Robert Ulrich at USAMRIID investigating the role of autophagy in the immune response to *S. pyogenes*. My studies involve the use of cellular, molecular and immunodiagnostic techniques and will give students the opportunity to gain expertise in techniques commonly used in biotechnology and biomedical research.

#### DR. TODD M. HURD

My research interests are mostly in ecosystem and plant community ecology, and include

- 1) rates and ecological effects of biological nitrogen fixation;
- 2) sources and ecological effects of nutrient additions to spring creeks;
- 3) effects of nutrient additions to forest and wetland ecosystems; and
- 4) hydrological interactions with chemistry and communities of wetland and aquatic ecosystems.

Current projects include: estimating ecosystem inputs of nitrogen from nitrogen-fixing black locust (*Robinia pseudoacacia*); use of aquatic plants and stable isotopes to indicate nutrient enrichment and sources of organic matter to local spring creeks; hydrological studies of local spring creeks, and isotopic tracing of heron predation on stocked trout.

DR. THEO S. LIGHT

My research interests are in the areas of aquatic ecology and conservation biology. Some of my specific interests include: invasion dynamics and the effects of invaders on aquatic communities; the effects of human and natural disturbance on stream communities; conservation ecology of freshwater invertebrates, particularly crayfishes; and the structure and dynamics of aquatic food webs. I am also open to student interests in any area of aquatic ecology

DR. DAVID R. LONG

My research interests focus on the morphology and reproductive biology of amphibians and reptiles. Current research includes examining salamander oral morphology as it relates to functional aspects of prey acquisition and manipulation. This research utilizes histological and scanning electron microscopy techniques. Research opportunities exist for students interested in vertebrate histology and morphology. I also direct the Health Sciences program and work closely with students who are interested in entering educational programs in the health professions.

DR. TIMOTHY J. MARET

I am interested in ecology and evolution. My research interests include the conservation biology of amphibians and reptiles (especially turtles), ecology of vernal pond organisms (particularly amphibians and aquatic insects), and the roles of competition and predation in regulating populations and structuring communities. I encourage interested students to talk with me about potential research activities.

DR. MICHAEL R. MARSHALL

My research interests concern various aspects of mycology and plant pathology. Current projects include investigations of the fungal flora associated with indoor air quality problems, and methods for utilizing and enhancing hypovirulence in *Cryphonectria parasitica*, the fungus responsible for the blight disease of the American chestnut. I also have an on-going interest in the biology of the *Ophiostoma ulmi*, the causal agent of Dutch elm disease.

DR. MICHAEL J. MCNICHOLS

My area of research interest is comparative and medical endocrinology. Specifically, I am interested in the role of hormones during development and the aging process. Additionally, I have studied the physiological ramifications of abnormal hormone levels as well as alterations in normal function of the mammalian heart due to disease.

DR. EARL L. NOLLENBERGER

Current research centers on histochemical and EM studies on cellular/tissue effects of environmental toxins and cellular adaptation to sublethal toxication involving the cytochrome P<sub>450</sub> system. Interests also include studying the effects of nutrition or aging at the cellular/tissue level. Undergraduate participation or independent projects are encouraged as well as graduate research.

DR WILLIAM J. PATRIE

My research interests include the molecular biology of glioblastoma cell lines, with current research examining human endogenous retroviruses (HERVs) and epidermal growth factor receptor (EGFR). HERVs are retroviruses that have become permanently integrated into the human genome. Expression of HERV genes is frequently associated with proliferating cells, including human cancers. EGFR is a part of the cell division-stimulating signaling pathway that frequently acquires oncogenic mutations. I also collaborate with other biology faculty (Drs. Lehman, Elliott, and Stewart) in projects using molecular techniques to characterize bacteria that include pathogens carried by ticks and various environmental samples.

DR. GREGORY S. PAULSON

My main research interest is applied ecology, specifically its application in the control of pestiferous insects. I am also interested in ant population structure, insect morphology, and insect behavior. I have a strong background in SEM and macrophotography.

DR. HEATHER SAHLI

My primary research interests are at the interface of ecology and evolutionary biology as I strive to understand adaptive evolution in plants, the forces driving plant population differentiation, and variation in plant-insect interactions across populations. To address these questions I use a combination of field studies, greenhouse experiments, and molecular techniques. Studies in my lab include: 1) Examining plant adaptations by measuring natural selection on plant traits by various selective agents such as pollinators, herbivores, and different environmental conditions, 2) Studying

the reproductive biology of plant species and factors limiting reproduction in rare and threatened plant species, 3) Examining how plants and pollinators are interacting at the community level and how these plant-pollinator interactions change across habitats, and 4) Measuring gene flow, genetic drift, genetic diversity and population differentiation of both widespread and rare plant species using population genetics. I welcome students interested in doing research on any of the projects listed above or on other topics related to plant ecology and evolution.

DR. RICHARD L. STEWART, JR.

My research interests are in parasitology, entomology, and natural history. Some of my current projects include: assessing local mammal populations like the Allegheny woodrat, understanding diseases and parasites of predators and deer, evaluating off-host survival of local tick species, and assessing survival of temperature dependent water boatmen (Hemiptera: Corixidae). I strongly encourage students with related interests to inquire about conducting research.

DR. NATHAN E. THOMAS

My primary research interest is in physiological ecology as a tool for conservation biology. I focus primarily on avian migration and cold tolerance using blood plasma metabolites and corticosterone as indicators of energetic condition and stress. Other interests include the role of climate change on avian migratory stopover habitat and the physiological condition of birds utilizing restored habitats during migration and as nesting sites. I encourage any students that are interested in undergraduate or graduate research to contact me.